



## **Sculpting light for new biophotonics applications.**

**Glückstad, Jesper; Palima, Darwin; Villangca, Mark Jayson; Bañas, Andrew Rafael**

*Publication date:*  
2015

*Document Version*  
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

*Citation (APA):*  
Glückstad, J., Palima, D., Villangca, M. J., & Bañas, A. R. (2015). *Sculpting light for new biophotonics applications..* Paper presented at The 23th Annual International Conference on Advanced Laser Technologies , Faro, Portugal.

---

### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

# Sculpting light for new biophotonics applications

**J. Glückstad<sup>o\*</sup>, D. Palima\*, M. Villangca\* and A. Bañas<sup>o\*</sup>**

*\*DTU Fotonik, Programmable Phase Optics, Techn. Univ. Denmark*

*<sup>o</sup>GPC Photonics ApS, [www.GPCphotonics.com](http://www.GPCphotonics.com)*

*[jesper.gluckstad@fotonik.dtu.dk](mailto:jesper.gluckstad@fotonik.dtu.dk) [www.ppo.dk](http://www.ppo.dk)*

Generalized Phase Contrast (GPC) is a power efficient approach for generating speckle-free contiguous optical distributions using spatial phase-only light modulation. GPC has been demonstrated in a variety of applications such as optical micro-manipulation [1], active microscopy [2], structured illumination, optical phase encryption, and recently in contemporary biophotonics applications such as for real-time parallel two-photon optogenetics and neurophotonics [3]. Our most recent GPC light sculpting developments will be presented. These include both static and dynamic GPC Light Shapers where lasers have to be actively shaped into particular light patterns [4]. We show the potential of GPC for biomedical and multispectral applications where we demonstrate phase-only light shaping of a supercontinuum laser over most of its visible wavelength range [5].

- [1] J. Glückstad, "Optical manipulation: sculpting the object", *Nature Photonics*, Vol. 5, 7-8 (2011).
- [2] D. Palima, and J. Glückstad, "Gearing up for optical microrobotics: micromanipulation and actuation of synthetic microstructures by optical forces," *Laser & Photon. Rev.* 7, 478-494 (2013).
- [3] E. Papagiakoumou, F. Anselmi, A. Bègue, V. de Sars, J. Glückstad, E. Y. Isacoff, and V. Emiliani, "Scanless two-photon excitation of channelrhodopsin-2," *Nature Methods* 7, 848–854 (2010).
- [4] A. Bañas, O. Kopylov, M. Villangca, D. Palima and J. Glückstad, "GPC Light Shaper: static and dynamic experimental demonstrations," *Opt. Express* 22, 23759-23769 (2014).
- [5] O. Kopylov, A. Bañas, M. Villangca, and D. Palima, "GPC light shaping a supercontinuum source," *Opt. Express* 23, 1894–1905 (2015).